

[0476] It should be noted that dimensions, sizes, and quantities listed herein are exemplary, and the present invention is in no way limited thereto. In an exemplary embodiment of the invention, a patch-sized fluid delivery device may be approximately 6.35 cm (~2.5 in) in length, approximately 3.8 cm (~1.5 in) in width, and approximately 1.9 cm (~0.75 in) in height, although, again, these dimensions are merely exemplary, and dimensions can vary widely for different embodiments.

[0477] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

What is claimed is:

1. A needle injector device for connection in fluid-flow communication with the inlet or outlet port of a reservoir, the needle injector comprising:

- a housing;
  - a needle supported in the housing for movement relative to the housing between a start position, an extended position and a retracted position, the needle having a piercing end having an opening and an opposite, second end;
  - a fluid conduit connected to the second end of the needle and moveable with the needle;
  - a first bias member supported by the housing and arranged to impart a first bias force in a first direction on the needle from the start position to the extended position of the needle;
  - a second bias member arranged to impart a second bias force in a second direction, opposite to the first direction, for moving the needle from the extended position to the retracted position;
- wherein at least a portion of the first bias member is located outside the housing, and wherein at least a portion of the second bias member is located outside the housing.

2. A device as recited in claim 1, further comprising:

- a lever member connected in a fixed relation to the needle and having an extension portion extending through the slot-shaped opening in the housing;
- a lock structure for locking the first bias member in a first state at which the first bias member is ready to impart a bias force on the lever member, but does not impart its full force on the lever and for selectively releasing the first bias member to impart its full force on the lever.

3. A device as recited in claim 2, wherein the first bias member is configured such that upon releasing the first bias member, the first bias member imparts a force on the lever member that overpowers the force of the second bias member, to move the lever member and needle from the start position to the extended position against the bias force of the second bias member.

4. A device as recited in claim 3, wherein, the lever member is configured to be released from the first bias member, upon the lever member being moved to the

extended position, to allow the bias force of the second bias member to move the lever member and needle to the retracted position.

5. A device as recited in claim 4, wherein the lever member comprises a bendable or breakable portion that bends or breaks to disengage from the first bias member, upon the lever member being moved by the first bias member to the extended position.

6. A device as recited in claim 1, wherein the extension portion of the lever member is positioned to extend at least partially outside of the housing.

7. A device as recited in claim 6, wherein the first bias member is arranged to impart the first bias force on the extension portion of the lever member at a location on the extension portion that is outside of the housing.

8. A device as recited in claim 6, wherein the second bias member is arranged to impart the second bias force on the extension portion of the lever member at a location on the extension portion that is outside of the housing.

9. A device as recited in claim 6,

wherein the first bias member is arranged to impart the first bias force on the extension portion of the lever member at a location on the extension portion that is outside of the housing, and

wherein the second bias member is arranged to impart the second bias force on the extension portion of the lever member at a location on the extension portion that is outside of the housing.

10. A device as recited in claim 5, wherein the bendable or breakable portion of the lever member is a breakable portion configured to break to disengage from the first bias member, upon the lever member being moved by the first bias member to the extended position.

11. A device as recited in claim 1, wherein the piercing end of the needle is positioned inside the housing when the needle is in the retracted position.

12. A device as recited in claim 2,

wherein the lock structure is located outside the housing.

13. A device as recited in claim 2,

wherein the lock structure comprises a pivotal lever pivotally coupled to the housing.

14. A device as recited in claim 13,

wherein the first the pivotal lever is pivotal between first and second pivotal positions and is configured to hold the first bias member in its first state when the pivotal lever is in the first pivotal position and to release the first bias member when the pivotal lever is in the second pivotal position.

15. A device as recited in claim 6,

wherein the extension portion of the lever member is positioned to extend at least partially outside of the housing throughout the motion of the needle between the retracted and extended positions.

16. A device as recited in claim 6,

wherein the extension portion of the lever member extends outside the housing at a fixed distance relative to the needle.

17. A device as recited in claim 1,

wherein, after retraction, the needle remains attached to the fluid conduit.

18. A method of making a needle injector device for connection in fluid-flow communication with the inlet or outlet port of a reservoir, the method comprising: